Results: At five years, 7.3% (CI 2.7—11.9%) of the elective intended to treat patients with EVAR had an increase in aneurysm diameter. 38.2 % of patients were registered with endoleaks during the follow up period but only 5.7 % had secondary procedures.13 % of patients had secondary procedures for other reasons 12.2 % of patients had early and 6.5 % late complications during the follow up period. Aneurysm rupture was seen in 1.6 % of patients. During the 5 years of follow up there was no statistical difference in standardized mortality ratio in patients treated with elective EVAR compared to the general population.

The 1 year mortality of those electively treated with open AAA repair and EVAR was 7.6%, and 6.3 % respectively. There was no statistically significant difference seen in 1 year mortality between elective open operation and elective EVAR.

Conclusion: Adhering to proven indications for use of EVAR gives a low long-term risk for increased diameter, low mortality rate and low rate of secondary procedures in treated aortic aneurysms compared to other published results. With this approach no statistical difference in standardized mortality was seen in patients treated with EVAR compared to the general population. This is the case even if the risk for AAA rupture after treatment will still not be entirely excluded with EVAR. The strict application of EVAR does not increase the mortality from AAA even if the number of open repairs will increase.

Hypogastric Artery Management during EVAR

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Introduction: Hypogastric artery (HA) revascularization in patients affected by abdominal aortic aneurysm (AAA) and submitted to endovascular repair (EVAR) is open to debate. Aim of our study is to analyze the outcomes in patients undergoing EVAR with exclusion of one or both hypogastric arteries.

Methods: In a prospective series of EVAR patients needing HA exclusion, we retrospectively reviewed our results in terms of peri-operative (30 day) and follow up rates of intestinal and spinal cord ischemia, buttock claudication (BC), skin necrosis, and sexual dysfunction (SD) in male patients. In case of aneurysms involving a single common iliac artery or iliac bifurcation, the unilateral HA was excluded by coil embolization, vascular plug deployment or simple coverage by endograft. In case of aneurysms involving both iliac arteries revascularization of at least one hypogastric artery was attempted. Techniques of hypogastric salvage included branch devices, flow modulator stents, sandwich, and periscope and bell bottom techniques.

Results: From January 2008 to December 2014, 427 patients underwent elective EVAR; among those 104 (24.3%) had iliac involvement needing HA exclusion. In 73 patients with unilateral iliac involvement (70.1%, group UH) as many single hypogastric arteries were excluded. Thirty-one patients (29.9%) had bilateral iliac involvement (group BH): 16 of those (51.6%) had one HA excluded with revascularization of the contralateral one (group BHR); in the remaining 15 patients (48.4%) both hypogastric arteries were excluded (group BHE). No 30 day or follow up aneurysm related mortality, intestinal or spinal cord ischemia were recorded. At 30 days skin necrosis was observed in 2 patients. BC, and SD rates in group UH were 17.8% and 8.2% respectively; in group BH, BC and SD rates were significantly greater in group BHE than in group BHR (53.3% vs. 18.5% and 46.4% vs. 12.5%, respectively; $p < 0.05$). At a mean 18.6 months follow up (range 4-—47), in group BHE, BC and SD rates were persistently higher than in group UH and BHR (respectively, 40% and 46.6% vs. 8.2% and 6.8% in UH, and 6.2% and 12.5% in BHR, $p < 0.05$). Data analysis disclosed that HA coil embolization was significantly associated with 30 days BC and SD (OR 3.92; 95% CI 1.27—12.1; $p < 0.05$).

Conclusion: Our results suggest that at least one HA should be salvaged in case of bilateral involvement. Unilateral HA exclusion seems to be related to acceptable complication rates at follow up. Coil embolization seems to be related to a higher peri-operative complications rate respect to plug or coverage.

Glycated Haemoglobin Influences the Growth Rate of Abdominal Aortic Aneurysms. A Sub Study from the Population based VIVA Randomised Screening Trial

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Introduction: Several studies have reported a paradoxically negative association between abdominal aortic aneurysms (AAA) and diabetes with a reduced prevalence and progression rate by almost half. However, reason remains unsolved and could be due to elevated blood sugar level, systemic level of insulin, medication or other factors. This study aimed to evaluate the role of elevated blood sugar, as glucose can induce cross-links in the extracellular matrix.

Methods: The cohort study was based on "VIVA", the randomised clinically controlled screening trial of men aged 65 —74 in Central Denmark Region. The screening included a questionnaire, ankle brachial index measurement and measurement of the abdominal aorta by ultrasound. Furthermore, follow up for up to five years were offered to AAA cases below 5 cm in diameter, while those above were referred for surgical evaluation. At follow up, full blood samples were drawn for glycated haemoglobin (HbA1c) and analysed.

We defined diabetes as HbA1c above 47 mmol/mol or an already verified diagnosis. The analyses were performed both as a conventional case-control study, comparing patients with AAA with and without diabetes, and as a cohort study concerning growth rate.

Results: At baseline, we found 619 (3.3 %) AAAs. 114 were lost to follow up or referred for vascular evaluation. In addition, full blood samples were only possible at 9 of the 13 screening locations leaving 346 AAA patients. Sixty-nine (20%) had defined diabetes (38 with known diagnosis, 31 with high Hba1c). Compared with the patients without defined DM, the patients with diabetes differed in comorbidity seeing as they had more angina (20.9 vs. 13.0%), peripheral arterial disease (39.1 vs. 25.7%), and hypertension (71.0 vs. 50.4%). Median baseline aortic diameter was 35.4 vs. 34.0 mm with and without diabetes respectively ($p = 0.83$), while the median growth-rate was 1.66 vs. 2.66 mm/year with and without diabetes respectively ($p < 0.000$). We found a significant association between AAAs growth rate and HbA1c (Spearman's rho: -0.159, $p = 0.004$), but no association between the maximal antero-posterior AAA diameter and HbA1c (Spearman's rho: -0.088, $p = 0.112$).

Conclusion: Exploring the association between AAA and diabetes, we found an inverse relation between the growth rate of AAAs and the level of HbA1c indicating that long lasting elevated blood sugar impairs aneurysmal progression, probably by inducing cross links in the extracellular matrix.

Prosthetic Vascular Graft Infections: Cultures from NPWT Foams Are of No Value

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Introduction: In recent years prosthetic vascular graft infections are increasingly operated in a graft-preserving manner together with the use of negative pressure wound therapy (NWPT). The use of NPWT in vascular graft infection shortens the time to complete wound healing, has a high success rate, and the complication rate is low. During NWPT either polyurethane- or polyvinyl alcohol containing sponges are exchanged on a regular basis. The aim of this study was to compare bacteria retrieved from the NWPT-sponges with the bacteria detected by conventional methods in order to examine if microorganisms from NPWTW sponges help to determine the bacterial burden of vascular wounds.

Methods: Diagnostic accuracy of NPWT sponges was assessed. The standard of reference was a microbiological culture, obtained after open biopsy or graft explantation. We calculated sensitivity, specificity, positive predictive (PPV) and negative predictive values (NPV).

Results: 109 negative pressure wound therapy treatment cycles were performed among 104 patients with prosthetic vascular graft infections.

Median duration of negative pressure wound therapy was 36 days (Interquartile range [IQR] 19-—62) with a median pressure of 75 (IQR 62—125) mm Hg. The NWPT system was changed 10 times (SD 9.4) in each patient yielding 506 microbiological samples. In 55 patients deep wound cultures could be compared to cultures from the negative pressure wound therapy foams. Sensitivity, specificity, PPV and NPV for bacteria retrieved from negative pressure wound therapy foams compared to deep wound cultures as gold standard were 67%, 56%, 65%, and 58%, respectively (Table 1).

Conclusion: Antimicrobial therapy should primarily focus on deep wound cultures, whereas bacteria obtained from NWPT foams seem to be less important.

Endovenous Laser Ablation in Patients with Venous Ulcers: Long Term Results and Risk Factors for Non-healing or Recurrence

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Introduction: The ESCHAR study showed that superficial venous surgery reduced the recurrence rate compared with compression therapy only. Ulcer recurrence rates after endovenous laser (EVL) treatment for superficial venous insufficiency seem comparable, but so far only small groups and shorter follow up times have been reported. The aim of this study was to investigate long term treatment outcomes of patients with venous ulcers treated with EVL in a larger population, in ordinary clinical practice without dedicated ulcer care.

Methods: One hundred and ninety seven consecutive patients previously treated with EVL for a healed or open venous ulcer were invited to follow up including clinical examination, quality of life score using EQ5D, Duplex, ankle brachial index, venous refilling time (RT) and pump volume measured with PPG. Risk factors for non-healing and/or recurrence were calculated using chi-square to compare proportions and logistic regression.

Results: 197 patients have been examined after a mean follow up time of 41 months. After EVL further ulcer treatment and compression was carried out mostly in primary care. Details of post-operative treatment were not possible to retrieve. 165 patients had healed ulcers (Group 1) without recurrence during follow up, 32 patients never healed or had a recurrence after EVL (Group 2). The mean age was 62.7 years for group 1 and 64,2 for group 2 (NS). The number of women/men was 99/66 in group 1 and 14/18 in group 2 (NS). Significant risk factors for non-healing and or recurrence were reduced ankle mobility ($p = .009$), perforating vein insufficiency (PVI) in the ulcer area ($p = .007$), popliteal and crural vein insufficiency ($p = .016$ and .000 respectively) and shortened RT ($p = .016$).

There was a greater proportion in group 2 with previous deep venous thrombosis, diabetes, remnant varicose veins (VV) in ulcer area, and they had lower QoL, but no significance was reached. Other non-significant risk factors were cardiovascular disease, previous VV surgery, smoking, C5 or C6 at EVL, skin disease and remnant VV outside ulcer area.

Conclusion: Endovenous laser ablation treating patients with venous ulcers in ordinary clinical practice confers long-term healing in a majority. Non-healing and recurrence was associated with reduced ankle mobility, deep and perforating vein insufficiency and shortened RT. It may be speculated that healing rates can be further improved with a more dedicated ulcer care and follow up post-operatively.

The Role of 3D Fusion Computed Tomography in the Enhancement of the Safety Profile of FEVAR.

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Introduction: Fenestrated endovascular aneurysm repair (FEVAR) has revolutionized the management of complex aortic aneurysms; however the procedure exposes operators and patients to more radiation than conventional open surgery. Three dimensional (3D) fusion computed tomography (CT) imaging is a new technology that may reduce radiation and facilitate faster repair. The primary aim of this study was to evaluate the radiation dose effect of introducing fusion imaging techniques to an expert team.

Methods: Procedural details were gathered prospectively for a cohort of 18 consecutive patients receiving fusion-guided (Fusion Group) FEVAR and compared with 21 patients treated in the immediate 12 months prior to the implementation of routine fusion imaging (Standard Group) at a centre with established expertise in FEVAR. Data distributions were found to be non-Gaussian, so non-parametric tests were used to compare procedure time (PT), radiation dose, dose-area product (DAP), fluoroscopy time (FT), estimated blood loss (EBL) and pre- and post-operative estimated glomerular filtration rate (eGFR) between the groups.

Results: There were 18 and 21 patients in the Fusion and Standard groups, respectively. The Fusion group received three 2 vessel-, ten 3 vessel-, four 4 vessel-, and one single vessel- fenestrated graft(s). The Standard group received five 4 vessel-, eleven 3 vessel-, four 2 vessel-, and one single-vessel graft(s). There was a significant reduction in PT for the Fusion group (median 285 min; interquartile range 265 —323) compared with the Standard group (420 min; IQR 330 —310 $p = <0.001$). There were significant reductions in radiation skin dose for the Fusion group (1.65 Gy; IQR 1.22—2.22) compared with the Standard group (4.39 Gy; 3.28—7.05 $p = <0.001$), and DAP; Fusion (173.64 Gy $cm2^2$; IQR 138.33 —232.77) vs. (264.93 Gy $cm2^2$; 173.37—366.85) for Standard ($p = 0.001$). Estimated blood loss was significantly reduced for Fusion (350 ml; 250—560) compared with Standard (1000 ml; 420—2300- $p = 0.01$). There were no significant differences in FT, and pre- and post-operative eGFR between the two groups. Weight and height were distributed equally across both groups.

Conclusion: Implementation of fusion imaging by a team with expertise in complex endovascular aneurysm repair significantly reduces radiation dose and other performance measures. A further unexpected benefit was significant reduction in operative blood loss probably secondary to the significantly shorter procedure time. These findings suggest that fusion imaging improves the overall safety profile of FEVAR for both patients and experienced providers.